

ON THE USE AND MANAGEMENT OF THE ROPE IN ROCK WORK

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CLIMBING WITH AND WITHOUT THE ROPE.* — Rock-climbing ability is very largely a matter of inborn talent and its use the result of natural instinct. Most good rock climbers have developed spontaneously, or at most under the imitation of others, and their early careers have consisted in carefree wanderings over the faces of cliffs, untrammelled by the presence of the rope and unworried by responsibility for companions. The rope, when they are first introduced to it, seems to them largely a restraint and a nuisance. They perceive, indeed, that in an occasional squeamish situation the protection it affords would greatly expedite matters by removing the grounds for hesitancy, and they allow that it increases the opportunities for acquiring altruistic merit in this world by giving a man the chance to tie himself up to weaker brethren and take them where they ought otherwise not to go. But their idea of a real climbing holiday is likely to remain an independent spree over the rocks, with the rope left coiled up in the closet at home.

Now, it is necessary to realize that the rope, in its final meaning, is the symbol which transforms an individualistic into a higher social enterprise. A bevy of unroped climbers, attacking a peak each for himself, will enjoy the pleasures of independence and self-sufficiency, but they will very likely pay for these by the less pleasant elements of personal competition and rivalry, under conditions ill-suited to them. With the roped party an entirely new set of attitudes and values supervenes. There is no question of rivalry, for each member has a definite position in the party, with definite responsibilities. Instead, the opportunity is fully given for developing comradeship and the consciousness of standing solidly together, under stress, for a common

* The present article considers its subject primarily from the standpoint of organized club climbing, and is founded very largely upon experience gained with the Appalachian Mountain Club during the last six years. No treatment of such a subject could, however, be independent of that by Mr. Geoffrey Winthrop Young in his book *Mountain Craft* (reviewed in *SIERRA CLUB BULLETIN*, 1921, vol. xi, no. 2, p. 226), and his remarks have in fact served to interpret much of the experience gained. Reference is made to this book, and especially to the chapter entitled, "Climbing in Combination," for a more comprehensive discussion.

cause. This is one of the finest experiences that mountaineering can afford. Furthermore, the climbing group is incomparably more efficient, just from the standpoint of morale, than the individual. The effective strength of a party lies very largely in its leader, and the strength of the leader is in turn very largely due to his social function. He feels himself the trusted forefront of his party, its selected delegate and instrument, and therefore, although he knows that the rope itself is often of no practical value to him, he moves ahead with a courage and confidence, an ease and security, that few persons climbing on their own responsibility could manage for long, if at all. For these reasons, even when the members of a party are of equal ability, the presence of the rope, uniting them into a true functioning group, adds much both to their capacity and to their final satisfaction.

LEGITIMATE USE OF THE ROPE.—There would probably be less objection to the rope on the part of most good climbers were its true use more generally understood. *The purpose of the rope is protective only; under ordinary conditions, it may never, with propriety, be used as a direct help in climbing.* Every pitch must be surmounted by one's own unaided abilities; to ask for a tug on the rope, or to employ it as a handhold, as beginners are always tempted to do, is to make use of artificial assistance which the leader himself did not possess and which destroys the value of the climb. The average run of guides, indeed, are always ready to encourage their tourists to grasp the rope in a difficult situation; but then guides have little interest *how* their man makes his peak so long as he *does* make it, and makes it quickly, permitting them to finish their job and return to the hotel in good time to secure another for the next day. According to amateur standards, however, no pitch has really been climbed where the direct aid of the rope has been resorted to, and since failure to climb any single pitch generally means failure to make the peak itself, no peak where this has occurred can properly be included in a climbing record. This rule of course is infringed hundreds of times each season, chiefly through ignorance; one desirable result of organized club climbing should be to secure its more general observance. However, this rule has some necessary exceptions. If a party is caught by oncoming darkness or bad weather, or has lost the way and is following an unnecessarily difficult route for a space, it may be highly desirable, to save time, that the following members come up by direct use of

the rope, and this can hardly be charged against them. Moreover, when a leader has surmounted a pitch by a *courte-échelle*, i. e. by standing upon his second's shoulders, it is naturally in order for the latter himself to follow up hand over hand upon the rope.

It is sometimes said that the rope "equalizes abilities" between the stronger and weaker members of a party, but this is wrongly put.* It merely *equalizes risk*, by providing for the weaker followers an artificial margin of safety which the stronger leader possesses by virtue of his natural capacity. An artificial equalization of *abilities* would not be in the interests of sportsmanship.

THE ROPE ITSELF.—Manila hemp, Italian hemp, and flax are rivals as materials for climbing ropes. Granted that each is of the best quality, long-fibered, no clear order of priority in point of strength has yet been established as the result of the various tests. Personal preference is based upon secondary qualities, such as initial pliancy, pliancy when wet, and durability.

The two standard English alpine ropes, one of manila and the other of flax, come very high when imported. The best procedure is to go to a first-class maker of yachting cordage and obtain his best four-strand, seven-sixteenths-inch rope. It should be good for a dead-weight strain of something over 2000 pounds.

Braided ropes have never disclosed the same strength, in tests, as "laid" ones. They are, however, beautifully supple under all conditions, and make ideal reserve ropes for roping down.†

Ropes should be new every season. Experiments conducted for the Appalachian Mountain Club at the Massachusetts Institute of Technology showed that ropes of all kinds, after normal use during a single season, had lost over one-half their strength.

LENGTH OF THE ROPE.—A party of two, tackling difficult rocks, should be bound together with an 80-foot rope. For a party of three, 120 feet is the best length, and there should be a somewhat greater interval between the leader and the second man than between the second and third men. On exceptionally long pitches the second man can then unrope if necessary, having a free end tossed to him after

* Except, indeed, that the "moral support" of the rope may be an important factor in determining ability. Many persons can climb, on a (physically unused) rope, passages they could not accomplish alone.

† Five-sixteenths-inch is large enough for such a rope.

the third man has first gone up. But a much greater than 70-foot interval (corresponding to an 80-foot rope) between two men soon becomes impractical: few leaders can climb ahead trailing such a weight of rope without having it affect their balance critically on the difficult passages they are supposed to be undertaking.

It is convenient to purchase rope in lengths of 200 feet or its multiples, cutting each such length up into one rope of 80 feet and one of 120.

COILING AND CARRYING THE ROPE.—The rope is best made up around the foot and knee, as one sits. If the first loop is passed around the foot from right to left and secured to the loose end by a square knot (thus getting this end safely out of the way), the succeeding loops will fall conveniently from left to right. The length of two loops, at the final end, should be wound spirally around the coil, after a preliminary half-hitch, and knotted, when the whole is in good shape for various methods of carrying. Swiss guides generally knot the tying string of the rucksack over the coil at one point and then let the coil hang, in a flat circle, between the back and the pack.

In undoing the rope it is generally futile to toss it in a heap, after its spiral binding has been removed, or to hurl it, guide-fashion, over a cliff in the hope that it will straighten itself out in the fall. Time and temper are saved if one suspends the coil on one arm and takes the loops off successively, one by one, as they were put on.

It is customary to relieve the leader of the work of carrying the rope to the beginning of the climb, as his strength most needs conserving. But when the climb is over it is sportsmanlike for the leader to assume the rope (often increased in weight and awkwardly stiff from water or ice) for the trudge homeward.

KNOTS.—End-men should tie on with the bowline. This has been shown by experiment to retain more of the strength of the rope than any other knot, owing to the fact that it contains no sharp loops and involves no direct counter-pulls. A leader who seriously anticipates coming on the rope should use a "double-knotted bowline"—i. e. one with a double small loop—which preserves 92 per cent of the strength of the rope.

The illustrations of the "double-knotted bowline," the "bowline and coil," and the "butterfly," as well as the instructions accompany-

ing them, are from an article on "Knots for Climbers," by C. E. T. Wright and J. E. Magowan, in the *Alpine Journal* for May and for November, 1928, (nos. 236 and 237, vol. XL). Thanks are due to these writers and to the Editor of the *Alpine Journal* for their use.

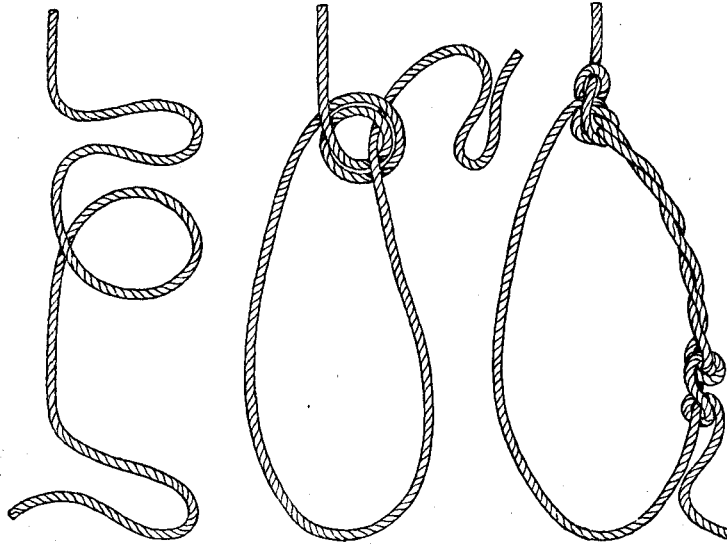


FIGURE 1

THE DOUBLE-KNOTTED BOWLINE

"Begin by making a counterscrew loop just as in the 'bowline.' Take up a small bight in the rope just beyond the loop and turn it back in the same sense to form a second loop, which must be laid on the first. Pass the end down through the double loop, round over the rope and up through the double loop again. Secure the end with a few turns and a couple of half-hitches made upward inside the rope at the waist."

The simplest knot for middle-men is the ordinary overhand loop; but it is also the weakest, as well as the most awkward to untie when jammed. The so-called "middle-man's noose" (an adaptation of the fisherman's bend) pulls loose if the strain is put upon a certain one of its ends: one must therefore know which end should run to the leader; and even then the knot will be insecure on a traverse where the effective holding may occur from behind. The best knot for middle-men is the "butterfly."

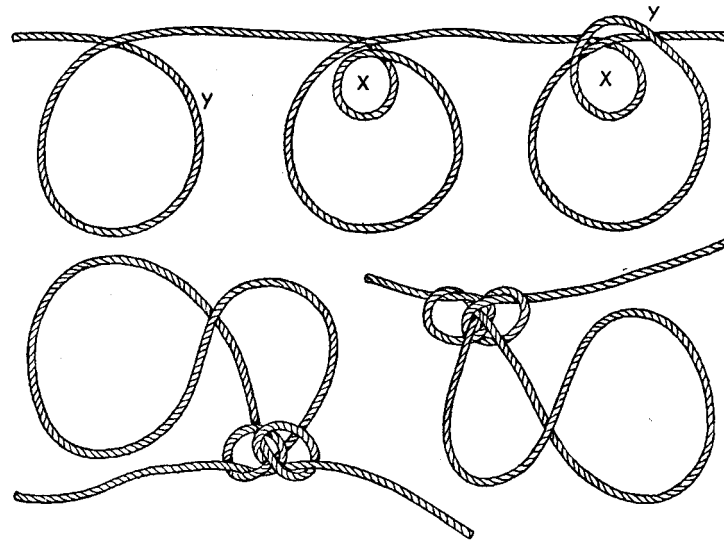


FIGURE 2

THE BUTTERFLY NOOSE

"Hold the rope with the two hands, the thumbs pointing toward each other and separated by a length of rope more than ample for the waist. Bring the hands together, the right in front, to form a right-hand loop, which hold, hanging in the left hand with the fingers passing through the loop from behind (Stage 1). With the right hand take the right-hand part of the loop at Y fairly close to the neck, and with a movement of the right hand make a small right-hand loop or turn round the left fingers at X. Keep it in position by placing the left thumb over it, and keep it open with the left fingers (Stage 2). Pass Y up over the rope (Stage 3) and through X from behind. In pulling it through, take it with the right hand and give it a half-twist screw-wise, which will cross the parts of the noose at the base and make it easier to draw the rest of the noose after it. In doing this do not pull the knot taut. It is better to strain the ropes and bring the knot into its proper form before tautening it.

"Put the noose on and adjust it to fit by passing the spare through the knot, keeping its form by holding it firmly in the left hand. The noose should always be put on so that its parts cross each other in the middle of the knot, the position into which they naturally fall. Tauten the knot but little.

"Open by drawing the wings of the butterfly apart, or pulling the noose back through the knot.

"In the illustration the finished knot is shown twice. In the figure to the right the knot has been turned over merely to show the inner side. The figure to the left gives its normal appearance."

NUMBER ON THE ROPE.—The fastest rock-climbing party is one of two; but it is less safe, and in some ways less efficient, than the rope of three. On club climbs, owing to the relative paucity of leaders, the latter is almost a necessity. More than three on a rope, in rock climbing, is very slow and cumbrous; on snow and ice, however, the

rope of four is often well enough. Except in emergencies, there should never be more than four on one rope, no matter what the traveling. With greater numbers all proper rope-technique becomes impossible, and the wearing of the rope itself passes from an element of security into an actual menace. The wholesale accidents to ropes of large numbers, which are so frequently reported, are no more than what ought to be expected under the circumstances.

THE ORDER ON THE ROPE.—If two, or even three, climbers of approximately equal ability are making a difficult ascent together, they will probably take the lead by turns. None wants it throughout, owing to its exhausting demands, while each wishes to try his hand at it. Generally, however—and this is always the case on club climbs—there are marked differences of skill and experience, and the positions on the rope are consequently fixed. Let *A*, *B*, and *C* be three climbers thus graded according to ability. Then the order on the ascent will be *A-B-C*. This is on the principle that the strength of the party should be concentrated at its head, where the chief struggle is going on. That *A* leads is self-evident; but, on difficult rocks, he will often require the sort of backing up that only a relatively experienced second can give. (It will appear in the sequel that the duties and responsibilities of the second man are often very considerable.) *C*, the weakest climber, is put in the position where his mistakes and shortcomings can least affect the progress of the party as a whole.

But if the course involves a number of traverses which it is inadvisable that *C* be left to cross last, secured only from one side, or if the ascent (e. g. a ridge climb over a series of gendarmes) contains a number of secondary descents which again *C* cannot make as last man, while to reverse the entire rope in each such instance would require too much time, *and if* the regular run of pitches is not so difficult that *A* requires really expert backing, then the order *A-C-B* may be preferable. (Guides regularly use this order, placing their tourist between two of themselves. But their professional principle of coddling the weakest—and the paying!—member of the party cannot of course rule on amateur climbs. Moreover, on really difficult ascents guides themselves use the order *A-B-C*, meaning a double-header of professionals with the tourist last; or, if they dislike to leave him thus unprotected, they insist that a third guide be present, who then follows the tourist in fourth place.)

On the *descent* the order is *B-C-A*. *A* goes last, affording his companions the direct protection of the rope, but himself descending without it. *B* leads, his experience being of service both in finding the route and in solving the technical problems of the various pitches; he can then materially assist *C*, and consequently expedite the movement of the entire party, by specific coaching. *C* has the responsibility of belaying *B*, but this can be done under *A*'s supervision.

PARTY ORGANIZATION.—Groups of two or more ropes following in order provide an organization particularly adapted to club climbing, as it takes care of greater numbers with fewer demands in the way of leadership. For as second-rope leaders men can be employed who would not yet be qualified to take charge of an independent string. The second-rope leader need not find the route, and the technical problems of the pitches are made easier for him through his observation of the earlier rope struggling with them, while on the one or two very difficult passages he can be dropped a securing line by his predecessors.

The group composed of two ropes of two each is in every way the best and most delightful of rock-climbing parties. It is nearly as fast as the single rope of two, and it has the reserve of strength necessary for meeting what might be considered both the normal and the abnormal contingencies of climbing. The party composed of two ropes of three each is generally the largest that ought to be on any given course at any one time, owing to the danger of loose stones.

ON MODERATELY DIFFICULT ROCKS—THE SHORTENED ROPE.—Rope technique varies radically according as the party is moving simultaneously and continuously over rocks of only moderate difficulty or one at a time up difficult "pitches."

In the former case the full length of the rope will not be required, and, if a considerable stretch of such climbing is anticipated, it will be convenient for the first and second men of a rope of three (on the descent, the second and third) to throw half a dozen coils of it over their shoulders. Grasp the rope with both hands, in front of the body and about four feet apart, thumbs pointing outward, much as a child holds a cord for skipping rope, the rope running from the chest knot to the right hand and then back across the body to the left; swing this section up over the head and back of the left shoulder, so that a loop

is formed running up and over the right shoulder and back and down under the left arm. When a sufficient number of coils are thus in place a new knot must be made, involving all of the coils *and the chest loop*, down at the left front; otherwise a pull on the rope will tighten the coils around the chest. (Deaths from strangulation, due to this, are on record.) The knot most used for this purpose is a flat knot made with a bight of the standing rope, which is pushed down under the coils and chest loop and then tied to the standing rope itself, but such a knot is awkward in itself and completely untrustworthy, as it is forever coming loose. Far better is an adaptation of the "bowline and coil," made with a loop of the standing rope together with the rope-end from the original chest knot (which end must have been left long enough for this purpose).

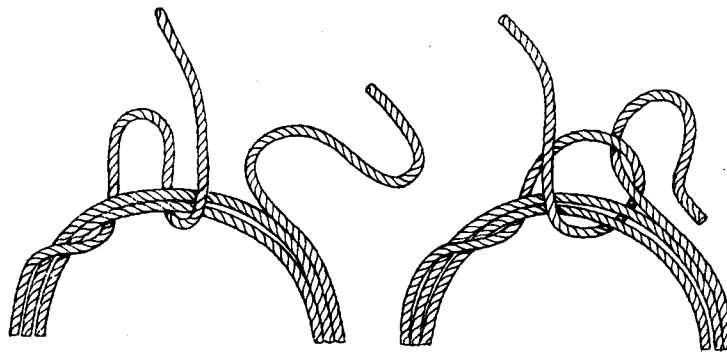


FIGURE 3

THE BOWLINE AND COIL

"Make as many turns round the waist as may be desired, passing the end always to the left, until the rope where it enters the coil and the end where it leaves the coil come close together in front. Take the rope at its entry into the coil in the left hand and with the thumb push a bight down inside the coil. Bring the bight forward under the coil (Stage 1) and press the rope a little to the left to lie across the bight. This forms the same right-hand loop as in the simple "bowline," but with the difference that the loop encircles the coil. Just as before, pass the end down through the loop (Stage 2), then to the left over the rope and up through the loop. Finish off the end by giving it a few turns round the bight of which it is the continuation and a couple of half-hitches round the coil, passing the end upward inside the bight or coil."

ROPE MANAGEMENT DURING CONTINUOUS MOVEMENT.—Though the rope, when it *is* needed, may be needed past calculation, to a party traversing not difficult rocks it is apt to seem for over nine-tenths of the time just something thrown in to make climbing in every way harder. The constant care that it demands lest it unexpectedly

jerk the man in front or tug the man behind, lest it catch on points of rock, jam in cracks, drag itself over sharp edges, through water or through snow, or loosen falling stones, is at first sheer vexation of spirit. Relief can come only when training and practice have made one so unfailingly "rope-conscious" that attention to its ceaseless demands has become automatic—while it always helps somewhat if one can develop an element of pride in the dexterity of one's rope-management, as in a minor art not without its own value. Until a party has become thus thoroughly "broken to the rope" its members will be sure to send back and forth along the line to each other a succession of such little irritations as will, in the aggregate, seriously color the climbing day. Splendid individual climbers who come late to the discipline of group work are especially likely to remain for some time offenders in this respect, causing, by their vagaries and irresponsibilities in handling the rope, much suppressed annoyance to their less capable but better-schooled companions.

First of all, "the arm, with the hand, has above all things to learn the mechanical swing which frees, frees, frees the rope in front of you, before, after, and even during each step, at whatever inconvenience to yourself."* Next, one must move with the minimum of interference to the others. To this end each member of a party requires a certain range of freedom, to allow for individual accelerations and retardations, since it cannot be expected that the ground will be of uniform difficulty or at least that various climbers will find it so. Hence the second and third men, on either ascent or descent, carry a number of coils of the rope ahead of them in the left hand; these are dropped and picked up again according as the distance to the men ahead increases or diminishes, without the need for calling upon these latter to modify their gait.† (This, however, they should of course instinctively do when they feel that a follower is in difficulty.) Nothing is more instructive in this connection than to watch a first-class guide in action. His party, say, is descending a fairly difficult chimney; the guide, as last man, shepherds down his two tourists, facing out-

* Young: *Mountain Craft*, p. 214.

† It may be worth remarking that, in contrast, when a party is moving together over covered glacier no member of it should carry any such easily loosened coils in the hand. Either the rope should be kept taut from waist to waist between each pair, or, if some rope-adjustment for varying intervals is desired, the coils may be carried *with a turn taken around the hand* after the last one, to provide a secure grip. For otherwise, if any member falls into a crevasse, he will at once drop the length of the coils carried by himself and his next neighbor, thus increasing both the danger of the fall and the subsequent difficulty of his extrication. Ignorance of this rule is extremely widespread.

ward and ready at any moment to lock himself by jamming into a rigid holding position should either of them slip. Reaching the easier ground below, the tourists inconsiderately start off at increased pace, leaving the guide still in difficulties. He, however, drops coil after coil as they move away; then, slithering rapidly down the lower reaches of the chimney and taking its last five feet in a clean jump, he races after his party, gathering up his coils again as he closes the interval. Not once has he found it necessary to utter that continual plaint of the amateur, "Wait a minute!" and throughout the rope has run neatly and directly from himself to his predecessors, instead of draping itself loosely about the rocks in those deep festoons which so regularly grace—and impede—the movement of an inexperienced party.

To have to climb with a coil of rope in the left hand is of course a handicap, and it may seem improper that this should be placed upon the two weaker members of the party, as it is, at least upon the ascent. Guides seek to obviate this by themselves carrying the loose rope; the tourist then follows like a tame bear, tugged at whenever he falls behind. In an amateur party, where one is free to assert one's dignity, one will generally prefer the handicap of the coils. In places of greater difficulty one can frequently throw one's handful of rope up ahead of one, thus freeing both hands. Moreover, matters are somewhat evened up by the fact that a leader also should carry a couple of coils for purposes of belaying—a subject to which we now come.

SECURING DURING CONTINUOUS MOVEMENT.—To put the rope to its essential purpose, that of affording security, is both easier and more difficult, upon simpler rocks, than it is upon pitches. It is easier, physically, because owing to the character of the terrain the question is only one of *checking a slip*, not of breaking an abrupt fall. It is assumed that the strain on the rope will not be severe and that it need not be met instantly (these two, in fact, being the conditions which justify any carrying of loose coils at all). One who slips must immediately sing out—the false pride of manly silence is here a social offense—whereupon the men above him at once stiffen into positions of solidity. A leader carrying a little spare rope may be able to throw a quick belay over a rock beside him; a second man holding a third can use his coils for a similar purpose, anchoring himself and taking the jerk directly on his chest loop. At any rate, rocks adapted to continuous movement are by nature such that secure stances are

present throughout them, and the watchful and experienced climber should be able to adopt adequate holding positions at call.

But, psychologically, to meet the demands which may be made upon one under such circumstances becomes very difficult. Rapid movement over relatively easy rocks begets a sense of security, lulling to rest the tense apprehension of momentary danger; one becomes preoccupied with the fascinating personal problem of getting over the ground with the maximum of speed and the minimum of effort, and tends to lose one's sense of group responsibility. Hence the call, when it comes, is only too likely to find one unprepared—a bit nonplussed, in fact, and hesitant during the golden moment, before the final tug comes, when one should be jumping into the stable position which training and the situation dictate. Here the professional guide will always be the incomparable superior of the amateur leader. He is so accustomed to traveling with climbers of the most unaccountable sort, persons who find occasion to slip in the least reasonable of places, that he is habitually never off guard. Even when climbing ahead on the ascent, he shows an uncanny sensitiveness to untoward occurrences in his party behind him; the least maladroitness in the rear secures from him a reflex compensating response. The amateur leader who would be adequate to his functions in this connection should himself have followed such a guide and imbibed some of his attitude and manner.

ON PITCHES—SUPPORTING THE LEADER MORALLY.—It is upon "pitches," i. e. passages which must be climbed in one heat, owing to the absence of intermediate stances, that the rope enters into its chief use and that its management becomes, correspondingly, most complex.

Arrived at the foot of the first pitch, *A*, the leader, drops any coils of rope he may have been carrying, and throws off, if the pitch looks long, any he may have placed about his shoulders, looks around to see that *B*, his second man, has likewise arrived and is ready to assume his functions, and attacks the problems before him. And now, while *A* is climbing, *B* becomes the key-man of the party. Nothing could be more erroneous than to suppose that he is momentarily off-duty, free to contemplate the landscape, indulge in a smoke or a bite to eat, or enter into casual and airy conversation with *C*. Aside from the fact that he has positive tasks upon which to concentrate, any such attitude of carelessness would operate seriously to impair *A*'s morale.

A leader, struggling alone with difficulties, must have nourished in him the feeling that he is the center of his party's tense interest; that he is every moment, it is scarcely too much to say, carrying with him their hopes and fears. Leave him morally, as he necessarily is physically, alone, and you cut the nerve of his inspiration and enterprise. No indication should ever go up to him that his party has mentally forsaken him or that the occasion has for them anything but the earnestness which it is bound to assume for himself. For maintaining the general atmosphere in a state thus favorable to *A*'s condition of mind, *B*, as the man nearest in communication, is primarily responsible. *C* indeed may sit, smoke, and enjoy the view—and his long waits and uninspiring tail-end position certainly entitle him to that much compensation—but *B* may not become an active partner in his distractions.

On the other hand, *B* should not annoy *A* with a series of questions ostensibly expressive of friendly interest, but in reality generally too much the product of a disconcerting impatience. "How is it going?"—"Can you make it?"—"Are you up?"—"Shall I come?" Let him possess his soul in peace, be his intentions never so good.

TENDING THE LEADER'S ROPE.—Of *B*'s positive duties, the first and basic is to tend *A*'s rope as it moves upward. For this purpose he takes it in both his hands, letting it run out along a favorable line. He must be constantly alert to see that it does not snag or jam, while, if it is in danger of doing so, he must under no circumstances whip it loose with a swing or snap. Should a kink or snarl appear, he quickly straightens it out while the rope is still running, only in the last resort calling to *A* to stop—for *A* may well be in a position where he *cannot* stop. As the rope approaches its end, he calls out, like a sailor heaving the lead, "Ten feet more—six feet—four feet!" in order that *A* may be warned in time to seek a suitable stance.

The importance of thus tending the leader's rope can hardly be overestimated. Most leaders rightly dread a backward tug on their rope, capable of pulling them off balance in the middle of a ticklish step, far more than they apprehend a fall due to the difficulties of the rocks themselves. Here too the ounce of prevention is worth the pound of cure, and the average leader would probably prefer a second man known for his unfailing alertness in watching the rope to one clumsy and unreliable in this respect but skilled in all the arts of belaying.

The unforgivable but by no means uncommitted sin in this connection occurs when, *A* calling down that his rope is caught, it develops that *B* is himself standing upon it. Any second man once guilty of this precious bit deserves to be demoted from his position for the remainder of the season!

BELAYING THE LEADER. — *B*'s second and more difficult duty, granted his adequate performance of the first, is to belay *A*, should the latter request it. (And every leader *should* request it, for the sake of his party if not of himself, at least upon all exposed faces and all delicate traverses.) It is in the art of establishing such a belay that a good second man can most distinguish himself—not by his experience, for fortunately few persons indeed have any in respect of this contingency of a leader's fall, but by his theoretical knowledge of principles and imaginative anticipation of consequences. The simplest notion of a belay is of course to feed the rope around a spike or bulge of rock; but it is a lamentable fact, deduced from numerous tests, that if a leader falls clean from over eight to ten feet above, sustaining a sheer drop of sixteen to twenty feet or more, the rope (*any* rope practical for climbing purposes), thus rigidly fixed, will most certainly snap. The remedy lies in what Young calls the "indirect belay," which is effected by interposing in some way the body of the belayer himself as a spring between the prospective weight and the final rock support. "If we have fair room to balance, we play the rope entirely free with our arms and the spring of our body, using only an anchor * to the rock if we need it. If we have not room, and especially if we are protecting a leader, whose fall would jerk us off most positions of free balance, we put the rope over the point and play it round with both hands, ready to grip and spring it upon our arms if a jerk comes. Or we pass the active rope round our forearm or over the thigh or across the shoulder, on its way to the belay-point."† The rock-climbing world is in dire need of a specific treatise by an authority such as Mr. Young describing in detail the various attitudes possible for the indirect body belay; meanwhile, its arrangement is left in each case to personal ingenuity. Every second man should however clearly understand that if he merely lays the rope around a

* Young distinguishes an *anchor*, "the loop of inactive rope with which a stationary climber secures himself to a rock point," from a *belay*, "which is the rock-and-rope attachment by which the active rope of a moving man is protected while it is running out or being pulled in." (*Mountain Craft*, p. 219).

† *Mountain Craft*, pp. 221-222.

rigid rock in such circumstances he is not even nominally doing his duty by his leader—in fact, he has as good as arranged at the outset, in case of accident, for a break in the rope which will save himself and the remainder of the party at the expense of the man climbing ahead.

BELAYING THE SECOND MAN.—*A*, having finished the pitch and arrived at a secure stance, at once casts about for a belay upon which he can hold *B*, and having found and laid the rope over such, or, in default of this, having adopted a position for holding the rope about his own body, he rapidly takes up such slack as remains. All this he can do while still regaining his breath, and by the time the slack is up he will have recovered sufficiently to be adequate to his next function. He now calls down simply, "Come!" and *B*, having already surmised the stage affairs have reached from the halt in the rope's advance followed by its rapid run-out to the end, and prepared himself accordingly, replies at once, "Coming!" and immediately starts to climb. No further passages of conversation are required between the two at this juncture—though out on the rocks a great many more will generally be heard before *B* finally gets going.

In belaying* from above, as distinguished from below, there is no objection to the use primarily of a rock spike, but even here the mechanical rigidity of such an arrangement needs some correction. The natural tendency is to seize the rope with both hands *beyond* the belay, in what seems like an immovable holding position; but under this method all sensitiveness of contact with the climber below is lost. *A* should stand facing the belay, one hand (say the left) *ahead* of it, upon the rope as it comes up from *B*, and the other beyond it; with the former hand he then *feels* *B* constantly, keeping the rope taut and under exactly the right tension at all times, while with the latter he takes in or pays out the slack and prepares to hold in case of emergency. Given a good belay, and the hand grips not too close up to it (which sacrifices friction and leverage), the average man will find one hand quite strong enough to hold if need be, or at least to hold

* A second man will sometimes call up that, the pitch being relatively easy, he does not require to be belayed, but wishes only that his rope be taken in out of his way as he climbs. Under such circumstances, however, no leader should stand in such a position that he could not eventually manage to hold if necessary; and, in general, to make a practice of such methods is dangerous, as it tends to make a leader careless in adopting and arranging his ordinary belays. Only a guide in continual training, or an amateur of unusual strength, can hope to be adequately prepared in case of a fall when merely holding the rope in his hands.

until the other can be transferred to assist it. Most guides indeed, who (it has been already remarked) have no interest whatever whether their tourists climb a pitch legitimately or not, are accustomed to sit down behind a belay, grasp the pulley-end of the rope firmly with both hands together, and prepare to haul or hold. The amateur belayer, however, should play his man like a fish. As *B* advances or momentarily retires (to make a new start at a difficulty), *A* takes him up or lets him out again, seeing to it that the rope is always ready to catch him with the minimum of jerk in case of a fall but never stretched enough to act as a real support in the ordinary course of climbing.

BODY BELAY.—Should no rock projection be available *A* must use a body belay, and, if the proposed rock belay is such that there is the slightest chance of the rope's slipping off it or jamming, this is the sounder position anyway, *for one experienced in it*. Sometimes a rock formation is such that, whereas it will not serve as a direct belay, its position or character fits it to serve as anchoring-point for a static rope to help preserve one's balance while one uses a body belay. This combination makes a very secure arrangement.

Body belays are made either standing or sitting. The instinct to get the center of gravity low generally urges the latter position, and we are often tempted to adopt it even when the brace for the feet or knees is by no means adequate. To one who has learned how to dispose his balance to meet a prospective pull the standing position seems equally secure, and it has the added advantages of utilizing more of the natural spring of the body and (generally) of leading the rope up to the belayer more directly, with less bending and scraping over corners. On the frequent case of the narrow ledge it is the only possibility. Generally speaking, sitting belays should be taken only when we are forced to sit anyway, as astride a ridge or jammed into a chimney. They are really secure only when at least one leg can be almost straightened against its brace, or the body otherwise locked behind a support. The rope goes round the waist, or under one and over the other shoulder, running *up* along the straightened leg, and is played with the two hands, one grasping it before and the other after it has passed around the body, so that sensitive touch can be maintained with the climber.

The standing belay can be made in three different ways, as illus-

trated in the photographs on Plate xxx. The rope may be supported either above the hips or upon a shoulder, and in the latter case one may stand either sideways to or facing the front of the cliff. In each case one leans sharply inward from the cliff, with the outer (forward) leg *nearly* extended and the inner (back) leg well bent; both legs thus afford a spring. (The outer leg should *not* be rigid. This would not only diminish the value of the spring, but in meeting a strong pull we should tend to pivot vertically around this leg, off balance, instead of being merely dragged downward, behind our point of support, upon the bending knee.) Further details for the three cases are as follows: (1) Hip belay. The stance is diagonal, about halfway between the sideways and forward positions. The rope comes up along and in front of the outer leg, to pass over and behind the outer hip; it is grasped below and in front of this hip by the outer hand, palm outward. It then encircles the waist and is held by the inner hand, palm outward, below and in front of the inner hip. (2) Shoulder belay. The rope comes up along the outer (or forward) leg, to pass over and behind the outer hip, and is grasped there as in (1). It then crosses the back and comes forward and down over the shoulder corresponding to the inner (or back) leg, and is held high up by that hand, palm of course inward. (Note carefully that in the forward position the rope comes *up* on the side corresponding to the extended leg, and passes *first under* that shoulder. Not infrequent mistakes are to bring it up on the side of the *back* leg, or to pass it first *over* the shoulder, or both.) In each case one hand grasps the rope before, the other after, it has passed round the body; the former *feels* the climber, the latter holds him.

Each of these three positions has its own peculiar advantages, according to the specific circumstances, and one should be familiar with them all. With the hip belay the tendency to be pulled out of balance is less, as the force is applied lower down and closer to the center of gravity; but this method puts a greater strain upon the arms and hands, which have to hold the rope in around the hips in order to obtain the necessary support, a factor of considerable importance for persons of relatively less strength (e.g. women). Also, the shoulder belay can be managed with one hand if necessary, leaving the other free to adopt a balance handhold, so that on difficult stances which yet afford such handholds it may be the safer. (There is, besides, a question of relative comfort, requiring individual solution, between the hip

and shoulder belays: the former takes the cut of the rope at a more sensitive spot, while the latter puts a greater strain upon the—possibly weak—muscles of the back.) As between the two different forms of the shoulder belay, choice depends upon the steepness of the rock. The sideways position, by permitting a more decided inward lean, enables us better to resist an outward pull, and it should therefore be adopted where the angle of the rock is such that a strong pull from this direction may be anticipated.* But on steeper rock, where, with the climber more directly below us, the outward component of pull is little and the downward component great, the forward position seems preferable, as it provides more effective friction of the rope about the body. Probably, as among the three types of attitude, the natural instinct of most climbers would suggest the sideways shoulder belay. It cannot be too strongly recommended, however, that instead of following this instinct without more ado they should experiment exhaustively with the other positions as well.

No one should have to attempt a body belay in a critical situation who has not had experience of just what it means to have the full weight of an average man thus thrown upon him.† Few persons are prepared for the tremendous drag downward that ensues—aware how firm must be the knees and how secure the balance to withstand it, or conscious how great a difference is made by the presence of even a little initial slack in the rope, permitting a drop which increases the effective weight. This last factor is so important that anyone using a body belay in a situation where his balance is at all doubtful must put a marked tension upon the rope, in spite of all the rules for amateur climbing and all specific protests from below, to ensure himself against the possibility of a shock. And for the same reason *B*, the climber, should at least see to it that there is never any noticeable slack in the rope. For him to climb ahead while *A* neglects his business, keeping a proud silence with regard to the loop of slack that is developing, is to place *A* most unfairly in a situation that will in all likelihood eventuate disastrously for him as well as *B* in case of the latter's fall.

* The sideways shoulder belay has also the unique property of enabling us actually to *lift* the man below, if necessary. Holding well with the outer hand, just above the level of the knee, bend quickly forward and inward as low as possible, swooping the inner hand downward to the ground to take in, over the shoulder, the slack thus created; now straighten up again, holding firm with the inner hand. Readjust the hand-grips and repeat.

† The Appalachian Mountain Club, warned by several near-accidents, has instituted the practice of accustoming leaders to this situation by arranging for falling tests, under proper safeguards, on local outings.

"Take up the slack!"—"Take up the slack!" should be called out insistently at every step until *A* finally grows alive to his duties both to *B* and to himself.

THE SUCCESSION OF PITCHES.—As soon as *B* appears at the stance—the moment, in fact, that he has grasped holds which will enable him to reach it securely—*A* throws the rope off the belay (be it a rock or his own body), and steps deftly aside, ready to enter upon the next pitch, leaving the stance itself free for *B*. Retarded reactions on *A*'s part, chaining him uselessly to his belay until *B* is within handshaking distance, frequently cause a deal of awkwardness and delay, from subsequent congestion of traffic, at this juncture. And *B*, immediately upon popping his head over the stance, should have fixed his attention upon *A*'s belaying position and absorbed all its details, so that he need not later inquire when he comes himself to belay *C*. He can reserve his exclamations about the pitch just climbed until a second or two later.

Supposing now that the next pitch is such that *A* requires only the tending of his rope, and not a belay, for himself, *B* can, if he is skillful and reliable, bring up *C* while *A* simultaneously climbs ahead. He has now the double task of belaying *C* and watching *A*'s rope at the same time. But he must never forget that his first duty is always toward *A*, the least-protected member of the party. Should *A*'s rope snag or snarl he must call out a warning in time, and then get *C* quickly into a position of provisional security until the mischief can be remedied. While his hands are automatically engaged in juggling the rope to *C*, his eye must never for a moment leave that traveling up to *A*.

If, however, *A* requires to be belayed for the succeeding pitch, then *C* must wait patiently during another period of climbing. Eventually he moves up to *B*, *B* to *A*, and *A* goes ahead again. Under no circumstances may *C*, without express permission from above, essay to climb to *B* while *B* is exclusively occupied with *A*. It is a first principle of roped climbing that no member of the party must move unless the others know that he is doing so and are prepared to accept any consequences. Otherwise all would be endangered by the irresponsible act of one.

When *C* has arrived at *B*'s platform there is a splendid opportunity for the latter to demonstrate his natural capacity to keep things ship-

shape, or the reverse. Somewhere on the little ledge lies the rope taken in from *C*; right with it lies the remainder of the slack to *A*; in the middle of the web stands *B* himself, perhaps entwined with a body belay which he has difficulty in shedding cleanly. To watch the antics of some second men in extricating themselves from this muddle of rope and getting all the lines into running order again, free from twists and kinks, is soon no longer funny, when it occurs at each stage of a climb.

ON THE DESCENT.—The descent of pitches involves no new principles of rope management (if we exclude the specific operation of “roping down”), but it does call for an even more careful application of those already discussed. To tend or to belay the rope of a leader descending last requires extreme delicacy of handling. For in this case he does not drag out his own rope, as upon the ascent, keeping it taut automatically, but we have to take it in for him, establishing its proper tension ourselves. On the one hand it must constantly be brought in out of his way as he climbs, and ever closer to its belaying point; but on the other this movement must never amount to the slightest tug upon him, an effect even more disturbing to a climber descending than to one ascending.

As the man from above arrives upon the stance, the man already there throws the rope off the belay, if he has been using one, and places his own rope over it, ready to be held. He can then at once take his departure, without waiting for the newcomer first to discover and adjust the belay to be used for him.

Rope management on the descent is also far harder, psychologically, than upon the ascent. A party intent upon a goal willingly submits to discipline, and may even take pride in it; one taking the inevitable homeward way, with success a thing of the past, too easily becomes lax in this regard. In the late afternoon hours, when we are wearily descending a series of pitches that have long since ceased to be interesting to us, the tendency is strong, following our wish to get ahead and be done with it, to leave the man behind more or less to his own devices. Climbing on the rope, on major expeditions, is always a matter which requires rigorous training and the development of fixed habits of response, and upon no occasion more than upon this.

ROPING DOWN.—A final word may be added on the subject of descending by means of the doubled rope. This procedure enables one



C

D

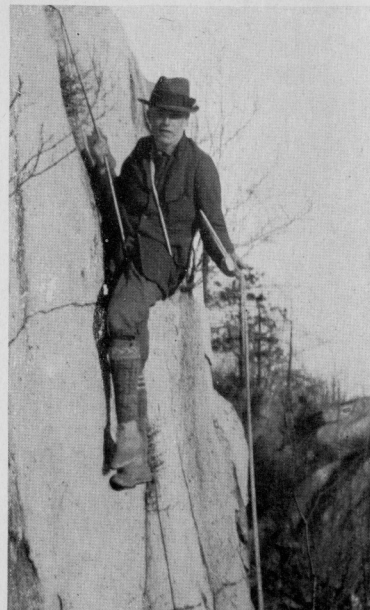
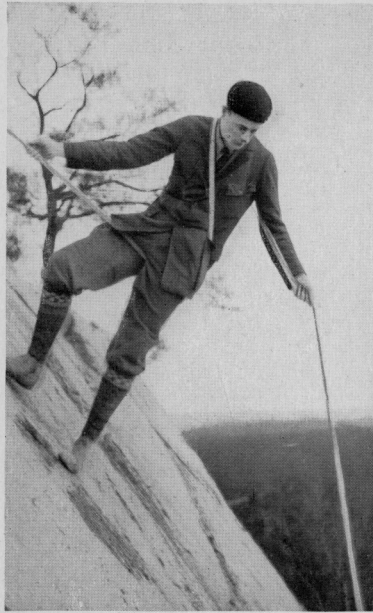
BODY BELAY

A—Hip Belay

B—Sideways Shoulder Belay

C—Forward Shoulder Belay (incorrect)

D—Forward Shoulder Belay (correct)



C

ROPING DOWN

D

to drop securely down over passages that have been climbed only with the greatest difficulty, or that could not be ascended at all. Besides being a valuable aid upon ordinary climbs, therefore, it may make possible the traverse of a peak by a descent over a series of precipices upon an inaccessible side. Furthermore, under sudden changes of weather, it often provides the only safe means of exit from a precarious situation.

Several methods of roping down are in vogue, but it is strongly believed that the following one, a favorite in the Tyrol, is much the best for all-round purposes. It is simple, quick, and reliable in adjustment, smooth-running and comfortable, and capable of adequate regulation in the amount of friction-braking that it affords.

The doubled rope having been placed about a suitable belay, stand astride it, facing inward, and grasp it in front with the right hand; pick it up behind with the left hand, thumb to the rear, and carry the loop forward, upward, and across over the head, so that the rope now runs under the left thigh, up across the body in front, and down over the right shoulder. To decrease the friction, lift and feed the rope up behind with the left hand; to increase it, tighten the rope by a grip there (Plate xxxi, A). To stop and lash oneself fast in case of emergency (as when a pause is necessary to consider the route, or step-cutting must be undertaken at the landing), bring the free end forward over the left shoulder and down between the legs again. If the rope shows any tendency to slip off the right shoulder during the descent, turn slightly sideways, with this shoulder uphill.

The secret of an easy and competent rope-down, as of so many other things, is freedom from stiffness and hesitation. Walk resolutely backward over and down the cliff, throwing the body backward into the rope and keeping the legs perpendicular to the slope. Take the whole thing jauntily—*dance* down the cliff! An expert will let the line simply slide through his hands, and, keeping a steady even tension, to prevent the rope's being sprung off the belay above, run swiftly and smoothly down; or if the attachment above is secure against jerks, he will shrug the rope loose upon his shoulder and drop down in long bounds, springing away from the rock. Such a rope-down is immensely exhilarating.

If the cliff is really perpendicular, or even overhanging, a development of this method is in order. In adjusting the rope, carry the loop around the neck (turn up the coat-collar) and let it fall down again

in front of the left shoulder (Plate xxxi, B). This so increases the friction that one can now sit in the rope and descend by its support alone, the feet hanging free. Either both hands grasp the rope above, as when working over a shelf, or one hand holds the free end, to control the braking (Plate xxxi, C). If, as may be the case, the friction proves too great (especially at the start, with a great weight of rope hanging below), reduce this adjustment to the preceding one by throwing the rope off the left shoulder (Plate xxxi, D).

The doubled rope is recovered from below by pulling upon one of its ends (see that there are no knots). Before the last man has descended a test should be made to see that the rope runs freely around the belay. In many cases this will require the use of an auxiliary rope-sling, cut to length from a supply of lighter reserve rope and tied in double or treble thickness around the belay. The main rope then runs through this sling—which has of course to be abandoned upon each occasion.